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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,616	05/25/2005	Migaku Takahashi	YIPO-0002	7845

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EXAMINER	
LOUIE, MANDY C	

ART UNIT	PAPER NUMBER
1715	

NOTIFICATION DATE	DELIVERY MODE
08/20/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptomail@rkmlegalgroup.com

Office Action Summary	Application No.	Applicant(s)	
	10/509,616	TAKAHASHI ET AL.	
	Examiner	Art Unit	
	MANDY C. LOUIE	1715	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06/02/10*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/2/10 has been entered.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 2 recites “formed in such a way that said oxygen and/or nitrogen may be contained in the film” is indefinite whether oxygen and/or nitrogen is contained in the film.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-2, 6, 8-9, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey [US 6280813] in view of Egelhoff [Oxygen as a surfactant in the growth of giant magnetoresistance spin valves].

Regarding claim 1, Carey teaches a method of producing a magnetic recording medium comprising: providing a nonmagnetic substrate; forming a metal underlayer formed of Cr or a Cr alloy on said substrate; forming a ferromagnetic metal layer, wherein said ferromagnetic metal layer contains a plurality of ferromagnetic films and a nonmagnetic metal spacer formed between said ferromagnetic films, wherein the step of forming said ferromagnetic metal layer is a step of forming alternatively a plurality of ferromagnetic films and one or more nonmagnetic metal spacer layers or layers in a multilayer [abstract, Fig. 3]. However, Carey appears to be silent in allowing at least the interface between said nonmagnetic metal spacer or layers and said ferromagnetic films to adsorb physically oxygen and/or nitrogen. Egelhoff remedies this.

Regarding claim 1, Egelhoff teaches forming a spin valve structure of a GMR comprising two ferromagnetic films and an intermediate spacer layer [Fig. 1], wherein at least the interface between said nonmagnetic metal spacer layer or layers and said ferromagnetic films to adsorb physically oxygen and/or nitrogen (i.e. exposure to oxygen atoms) [pg. 6143, col 2; pg. 6144-6145].

It would have been obvious to one of ordinary skill in the art at the time of the invention to allow an interface between the spacer and ferromagnetic film to adsorb oxygen or nitrogen as suggested by Egelhoff. One would have been motivated to do so in order to minimize magnetic coupling between ferromagnetic layers [Egelhoff, pg 6144, col 2] and other described advantages; wherein Carey teaches desiring antiferromagnetic coupling (i.e. minimizing magnetic coupling) [col 3, ln 15-16] and gleaning from similar spin valve structures from GMR devices [col 3, ln 40-45].

Regarding claim 2, the prior art teaches the nonmagnetic metal spacer layer or layers is or are formed in such a way that said oxygen and/or nitrogen may be contained in the film of the nonmagnetic metal spacer layer or layers [Egelhoff, pg 6145, col 1].

Regarding claim 6, the prior art teaches the step of allowing at least the interface between said nonmagnetic metal spacer layer or layers and said ferromagnetic film to adsorb physically oxygen and or nitrogen is a step of exposing the surface of said nonmagnetic metal spacer layer or layers to an atmosphere containing oxygen and/or nitrogen [Egelhoff, pg 6144, col 2].

Regarding claim 8, the prior art teaches the metal spacer layer may contain Ru, Ir or Cu [Carey, col 3, ln 30-31].

Regarding claim 9, the prior art exemplifies the thickness of the spacer layer may be 0.6 nm [Carey, col 5, ln 39].

In regards to claim 19, teaching of the prior art is aforementioned; but does not explicitly teach a step of allowing all interfaces between the spacer layer and ferromagnetic films to adsorb oxygen and/or nitrogen. However, it would have been obvious to one of ordinary skill in the art that mere duplication of parts (i.e. adsorbing both sides of the spacer layer; hence all interfaces between the spacer layer and ferromagnetic layers are adsorbed of oxygen and/or nitrogen) would not have patentable significance since the advantages of one interface (i.e. front of the spacer) having adsorption would gain similar advantages as at other interface (i.e. back of the spacer) unless new and unexpected results is produced.

4. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey in view of Egelhoff and further in view of Maesaka [JP 2002025032].

Teaching of Carey in view of Egelhoff is aforementioned; however, does not explicitly teach wherein the gas used for forming the nonmagnetic metal spacer layer or layers is a mixed gas obtained by mixing oxygen or nitrogen with Ar or other rare gases. Maesaka remedies this.

Regarding claim 3, Maesaka teaches forming a layer incorporated with oxygen for a magnetic recording medium may be deposited on the substrate using a mixed gas obtained by mixing oxygen with Ar or other rare gases [0071].

It would have been obvious to one of ordinary skill in the art at the time of the invention to mix oxygen or nitrogen gas with a diluting gas such as argon as suggested by Maesaka. One would have been motivated to do so in order to use a well known technique (i.e. argon as a diluting gas) to effectively control the oxygen concentration during formation of the layer incorporated with oxygen (wherein Egelhoff suggests it would be desirable to allow continuous flow of oxygen, while also controlling the content of the incorporated oxygen [pg 6145-6146]).

Regarding claims 4 and 5, although the prior art does not explicitly teach the partial pressure of oxygen or nitrogen in the mixed gas is set at the claimed pressure ranges; it would have been obvious to one of ordinary skill in the art in light of the prior art to optimize the partial pressure as a workable parameter in order to obtain a desirable oxygen adsorption or concentration on the targeted surface [Egelhoff, pg 6144-6146].

5. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey in view of Egelhoff, and further in view of Shimizu [US 20020127433].

Teaching of the prior art is aforementioned; however, does not explicitly teach wherein the gas used for forming the nonmagnetic metal spacer layer or layers is a mixed gas obtained by mixing oxygen or nitrogen with Ar or other rare gases. Shimizu remedies this.

Regarding claim 3, Shimizu teaches a gas for forming a layer incorporated with oxygen for a magnetic recording medium may be deposited on the substrate using a mixed gas obtained by mixing oxygen with Ar or other rare gases [0087].

It would have obvious to one of ordinary skill in the art at the time of the invention to mix oxygen or nitrogen gas with a diluting gas such as argon as suggested by Shimizu. One would have been motivated to do so in order to use an operable equivalent means for (i.e. argon as a diluting gas) easily controlling the oxygen concentration during formation of the layer incorporated with oxygen; thereby promoting stable manufacturing [Shimizu, 0087].

Regarding claims 4 and 5, the prior art does not explicitly teach the partial pressure of oxygen or nitrogen in the mixed gas is set at the claimed pressure ranges; it would have been obvious to one of ordinary skill in the art in light of the prior art to optimize the partial pressure as a workable parameter in order to obtain a desirable oxygen adsorption or concentration on the targeted surface [Egelhoff, pg 6144-6146].

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carey in view of Egelhoff and further in view of Hartsough [US 4420385].

Teaching of the prior art is aforementioned; however, does not explicitly teach the exposure of the layer to oxygen is set at 10 Langmuir or more. Hartsough remedies this.

Regarding claim 7, Hartsough teaches oxidation of layer on a magnetic recording medium may be controlled based upon units of Langmuir for exposure, wherein such units may determine the speed at which oxidation is performed [col 6, ln 25-50].

It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the oxygen exposure of the layer to a specific Langmuir range (i.e. 10 or more) as a workable parameter. One would have been motivated to do so in order to achieve a desirable concentration of oxygen on the surface within a desirable amount of time (i.e. to improve throughput).

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carey in view of Egelhoff and further in view of Fukuzawa [US 20020048127].

Teaching of prior art is aforementioned; however, does not explicitly teach the exposure of the layer to oxygen is set at 10 Langmuir or more. Fukuzawa remedies this.

Regarding claim 7, Fukuzawa teaches forming a nano oxide or nitride layer between magnetic and metal layers of a magnetic recording medium [abstract], wherein the prior art teaches Langmuir affects the amount of oxygen provided on the targeted surface [0168-0170].

It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the oxygen or nitrogen exposure of a layer to a specific Langmuir

range as a workable parameter. One would have been motivated to do so in order to achieve a stable amount of element concentration on the targeted surface.

Response to Arguments

1. Objection of claim 6 is withdrawn due to applicant's amendments.

2. Applicant's arguments filed 06/02/10 have been fully considered but they are not persuasive.

Regarding applicant's argument of Egelhoff failing to teach a metal underlayer (formed of Cr or a Cr alloy) is moot in view of the new grounds of rejection as cited above.

Regarding applicant's argument of Egelhoff failing to teach a magnetic recording media is moot in view of the new grounds of rejection as cited above. However, it is further noted by the examiner that Carey provides support for gleaning from GMR structures to form similar structures in magnetic recording media.

Regarding applicant's argument of Egelhoff teaching away from the claimed range for partial pressure of oxygen or nitrogen, it is noted by the examiner that Egelhoff teaches an example wherein a pressure of ~10^{-4} Torr*s to supply oxygen was taught [pg 6144, col 2]. Although, Egelhoff teaches beneficial effect of oxygen exist around 5x10-9 Torr, evidence provided by applicant (i.e. Fig 8) is insufficient to show unexpected results in comparison to the partial pressure suggestions of the prior art.

Regarding applicant's argument of the secondary references (i.e. JP '032) failing to teach the interface between a metal spacer and ferromagnetic films is allowed to

adsorb physically oxygen and/or nitrogen, it is reiterated that Egelhoff teaches such limitation [pg 6144-6146].

Moreover, Applicant's arguments with respect to claims 1-9 and 19 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

1. No claim is allowed.

2. Claims 1-9 and 19 are rejected for the reasons aforementioned.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MANDY C. LOUIE whose telephone number is (571)270-5353. The examiner can normally be reached on Monday to Friday, 7:30AM - 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571)272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. C. L./
Examiner, Art Unit 1715

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1715